- We made two final adjustments to the comparative analysis due to economic factors. In particular, we:
  - made an adjustment for differences between per unit labor costs for TELCO and for other employers, and
  - made an adjustment for differences in the percentage of total output represented by labor costs for TELCO and for other employers.

Putting together all of these factors, we find that the impact of SFAS 106 on the costs of the average employer in the economy (including employers that do not offer post-retirement health benefits and/or are not affected by FASB's rules) is only 28.3% of the corresponding impact on TELCO. In addition, the Actuarial Analysis finds that SFAS 106 directly increases labor costs by 3% for the average employer offering post-retirement health benefits covered by SFAS 106. This 3% figure is an important input to the Macroeconomic Analysis.

Macroeconomic Analysis

The purpose of the Macroeconomic Analysis is to determine the extent to which the additional costs resulting from SFAS 106 would be passed through to an increase in GNP-PI. The Macroeconomic Analysis utilizes a macroeconomic model developed for Godwins by Professor Andrew Abel of the Wharton School of the University of Pennsylvania to address this question. The Macroeconomic Analysis finds that only 2.3% of direct SFAS 106 costs of the average employer in the economy are passed through to the GNP-PI. In addition, as a result of SFAS 106 the average wage rate in the economy would be 0.93% lower than it would have been in the absence of SFAS 106.

Effects of SFAS 106 on TELCO's Costs

As noted, the ultimate purpose of the study is to determine the extent to which GNP-PI reflects the additional costs incurred by the average Price Cap LEC (i.e. TELCO) as a result of SFAS 106. The table shown on page 2 summarizes our findings. Item (A) summarizes the Actuarial Analysis which finds that costs of the average company in the economy increase by only 28.3% as much as TELCO's costs increase as a result of SFAS 106. Because only 2.3% of the average increase in costs is passed through to the GNP-PI (item (B)), only 0.7% (item (C), 2.3% x 28.3%) of TELCO's additional costs resulting from SFAS 106 are reflected in GNP-PI. Thus, it would appear that 99.3% of TELCO's additional costs are left unrecovered. However, the Macroeconomic Analysis finds that the national wage rate would eventually be 0.93% lower than it would have been in the absence of SFAS 106. If TELCO were able to benefit from a similar reduction in its wage rate, such a reduction would recover an additional 14.5% of TELCO's direct SFAS 106 costs (item (D)). Taking account of the 0.7% recovery due to GNP-PI and the eventual 14.5% recovery due to the adjustment of the wage rate leaves 84.8% of TELCO's direct SFAS 106 costs unrecovered (item (E)).

II. DEVELOPMENT AND SUMMARY OF RESULTS

We wish to establish what percentage of the average Price Cap LEC's SFAS 106 costs will be reflected in the GNP-PI and hence what percentage will not be so reflected.

We begin with an actuarial analysis which proceeds in two steps. The first step in the actuarial analysis is to construct a composite company which accurately reflects the characteristics and benefit plans of the average Price Cap LEC. The second step is to determine the impact of SFAS 106 on this composite company relative to the impact of SFAS 106 on other employers in the GNP on the assumption that all additional costs are passed on completely into the GNP-PI. Following the actuarial analysis is a macroeconomic analysis to determine the extent to which the additional costs will, in fact, translate into higher prices and, therefore, affect the GNP-PI.

Construction of Composite Company ("TELCO")

Actuarial, benefit, economic and demographic data were collected on eleven Price Cap LECs. Data included was for total Telephone Operations consistent with amounts included on the 1990 ARMIS 43-02 for each Company. These data were then combined, treating each Price Cap LEC as if it were a division of the larger combined company. The characteristics of this composite company ("TELCO") are as follows:

Number of Active employees	613,193
Number of Retired employees:	294,482
1990 Average compensation per employee:	$38,533
1990 Total Revenue (in millions):	$82,512.9
1990 Total Value Added (in millions):	$61,338.4
Average Per Capita Claims Cost:	$3,075
Average Age of Actives:	41.6
Average Service of Actives:	16.6

Impact of SFAS 106 on the Average Price Cap LEC Relative to its Impact on All Employers in the GNP

There are 95.8 million private sector employees and 18.6 million public sector employees in 'GNP', all of whom (and their dependents) may incur medical charges in retirement. Public sector employers, however, will not record SFAS 106 expense even where the entity sponsors a post-retirement medical plan (public sector employers are not subject to FASB rules).

Of the private sector employees, 30.7 million are eligible to have a proportion of their charges in retirement met by their employer's medical plan (and which plan is subject to SFAS 106), the actual proportion depending on the detailed provisions of their employer's plan(s). It is this anticipated employer cost for those employees that is reflected in SFAS 106 costs. The proportion of the charges met is an effective measure of the overall level of benefit provided by a given plan. We will refer to it as the Benefit Level Indicator ("BLI"). We must establish the average proportion of covered employees' charges that will be met collectively by their employers - the GNP BLI.

Separately we will calculate the average proportion of charges met by the average Price Cap LEC - the TELCO BLI.

All other factors being equal (which they are not), the percentage of TELCO's SFAS 106 costs that would be reflected in the GNP-PI would be represented by the following ratio:

$$\text{BLI Ratio} = \frac{\text{GNP BLI}}{\text{TELCO BLI}} = \frac{\text{Benefit Level Indicator for the average employer in the GNP}}{\text{Benefit Level Indicator for TELCO}}$$

However, this ratio requires a number of adjustments:

- Adjustment for differences in demography which will affect the SFAS 106 impact of a given program (Demographic Adjustment).

- Adjustment for the differing impact on SFAS 106 costs of current retirees at TELCO compared with other employers (Current Retiree Adjustment).

- Adjustment for any differences in the extent to which TELCO is pre-funding its post-retirement benefits compared to other employers (Pre-Funding Adjustment)

- Adjustment for employees not covered by post-retirement medical programs or covered by programs for which SFAS 106 will not apply (Non-Covered Employees Adjustment).

- Adjustment for differences between per unit labor costs for TELCO and for other employers (Per Unit Labor Cost Adjustment).

- Adjustment for differences in the percentage of total output represented by labor costs for TELCO and for other employers (Labor Cost Percentage Adjustment).

Utilizing the data, methods, and assumptions described in Section III, we have determined the following values:

(1) GNP BLI = .2568

(2) TELCO BLI = .4390

(3) BLI Ratio = .2568 + .4390 = <u>.5850</u>

(4) Demographic Adjustment = .5438

(5) Current Retiree Adjustment = .9287

(6) Pre-Funding Adjustment = 1.313

(7) Non-Covered Employees Adjustment = .2684

(8) Per Unit Labor Cost Adjustment = 1.3062

(9) Labor Cost Percentage Adjustment = 2.0832

(10) SFAS 106 Cost Increase Ratio = BLI Ratio x (4) x (5) x (6) x (7) x (8) x (9) = <u>.2833</u>

The SFAS 106 Cost Increase Ratio can be interpreted as meaning that, at most, only 28.3% of the additional cost incurred by TELCO due to SFAS 106 will find its way into the GNP-PI because the average employer in the GNP will experience only 28.3% of the cost increase that will hit TELCO.

<u>Extent to which Impact of SFAS 106 on All Employers in GNP Translates into an Increase in the GNP-PI</u>

The effect of SFAS 106 on the GNP-PI is calculated using a macroeconomic model that has two sectors. In sector 1 employers do not offer post-retirement health benefits, and in sector 2 employers do offer post-retirement health benefits. The macroeconomic model treats the introduction of SFAS 106 as a direct increase in the cost of labor facing employers in sector 2. The baseline calculations using the model calculate the impact of SFAS 106 on the GNP-PI using the following information:

(1) sector 2 accounts for 32% of private sector employment;

(2) labor costs account for 64% of total costs in sector 1 and in sector 2; and

(3) SFAS 106 directly increases labor costs by 3% in sector 2.

Based on these inputs, numerical solution of the macroeconomic model indicates that SFAS 106 will increase the private sector price index by 0.0138%.

To put this result in perspective we calculate a back-of-the-envelope estimate of the effect of SFAS 106 on the private sector price index as follows: a 3% increase in labor costs raises total costs and prices in sector 2 by 1.92% (64%

share of labor costs in total costs x 3% increase in labor costs) and thus raises the private sector price index by 0.614% (1.92% increase in price in sector 2 x 0.32 share of sector 2 in private sector GNP). Thus, if all direct costs were completely passed through in prices, and if there were no change in the amount of labor employed and output produced by each employer, the private sector price index would increase by 0.614%. However, taking account of the impact of labor costs on the demand for labor, and the impact of price changes on the demand for goods, the macroeconomic model finds that the private sector price index increases by only 0.0138%. We define the "passthrough coefficient" as the increase in the price index according to the macroeconomic model divided by the back-of-the-envelope price increase. In the baseline calculation, the passthrough coefficient is 0.0225 (0.0138% ÷ 0.614%). The passthrough coefficient can be thought of as the percentage of national SFAS 106 costs that will actually be reflected in the private sector price index.

The GNP-PI covers prices of government sector production as well as prices of private sector production, with the government sector accounting for 10.6% of GNP and the private sector accounting for 89.4% of GNP. Because SFAS 106 does not apply to the government sector, the government component of the GNP-PI will not be affected by SFAS 106. Therefore the increase in the GNP-PI equals 89.4% of the increase in the private sector price index. This factor of 89.4% applies both to the back-of-the-envelope price increase and to the price increase calculated by the macroeconomic model. Thus, the back-of-the-envelope increase in the GNP-PI is 0.549% (0.894 x 0.614%) and the increase in the GNP-PI according to the macroeconomic model is 0.0124% (0.894 x 0.0138%). The passthrough coefficient is 0.0225 (0.0124% ÷ 0.549%) which is identical to the passthrough coefficient for the private sector price index.

Resulting Impact of SFAS 106 on TELCO Relative to its Overall Impact on the GNP-PI

As noted above, the average employer in the GNP will experience only 28.3% of the cost increase that TELCO will experience due to SFAS 106. Furthermore, we have seen that only 2.3% of the cost increase experienced by all employers in the GNP will be passed through to the GNP-PI. From the interaction of these factors we are able to conclude that only 0.7% of TELCO's SFAS 106 costs will be reflected in the GNP-PI and that 99.3% of these additional costs will not be reflected in this price index.

Additional Macroeconomic Effect of SFAS 106

In addition to the result reported above our macroeconomic model indicates that, in response to the impact of SFAS 106, the wage rate in the national economy will, over time, reduce in relative terms by 0.93% (i.e., relative to what it would have been in the absence of SFAS 106). To the extent that TELCO could also benefit from a relative reduction in its wage rate this would help to offset its increase in costs due to SFAS 106. If TELCO were able to achieve the full reduction of 0.93% this would finance 14.5% of its additional SFAS 106 costs. As noted, this wage rate reduction reflects the ultimate effect of SFAS 106 and would not necessarily fully occur in 1993 when SFAS 106 becomes effective.

Thus the combined effect of the impact of SFAS 106 on the GNP-PI and on the wage rate would still leave 84.8% of TELCO's additional SFAS 106 costs unrecovered.

III. DETAILED DESCRIPTION OF ANALYSIS

Impact of SFAS 106 on the Average Price Cap LEC Relative to its Impact on All Employers in the GNP

This section of our report is a re-iteration of Section II but with considerably more detail.

Construction of Composite Company ("TELCO")

As noted earlier, eleven Price Cap LECs submitted data for this study. Each firm informed us of its number of active employees and their average ages and average service, and of the number of its retirees covered by employer subsidized Medical Plans. We were also provided detailed descriptions of the Medical Plans for Retired Employees and of the results of actuarial studies of the impact of SFAS 106 on expensing for these Plans.

Our data included a distribution by quinquenial age and service cells for 125,000 active employees, and we used the shape of this distribution for the valuations needed for this report. The distribution was shifted as required, to fit the known average age and average service for all of the Price Cap LECs. A census was constructed from the adjusted distribution, which census represents the typical Price Cap LEC.

A Benefit Level Indicator was determined for each Plan. As noted earlier, this Benefit Level Indicator measures the relative value of individual plans. The methodology for calculating the Benefit Level Indicator for a given retiree medical plan is discussed in detail beginning on page 12. The Indicators were averaged and a Plan with the average Benefit Level Indicator was used for this study. As expected, the actuarial assumptions used for the calculation of the impact of SFAS 106 differed from study to study.

The discount rate was a single number for all but 1 of the 11 Price Cap LECs (an equivalent uniform rate was proffered for the one exception) and the discount rate for the composite firm, TELCO, was taken as the average of the individual rates, weighted by number of active employees. Simple averages could not be used for turnover assumptions or retirement decrements because such rates are one or two dimensional arrays. Therefore TELCO turnover was derived by doing valuations of a standard Plan using each firm's turnover rates, the TELCO census, and a standard retirement age. The turnover table for TELCO was taken from a collection of standard turnover tables used for Pension Valuations, and was selected as that table which when used with the TELCO census, standard Plan and standard retirement age gave the best agreement as to the SFAS 106 liabilities as determined by the aggregation of individual firm's actuarial studies.

The composite retirement age assumption for TELCO was derived by setting a pattern for each firm, which pattern gave the same average retirement age for an employee attaining age 55, ignoring mortality, as given by the retirement age assumptions used for the actuarial studies. These patterns had one free parameter (the level rate to be applied for ages 55 to 61), and the composite pattern was that pattern with the average value of the free parameter. TELCO's trend rates were derived using an analysis similar to that used for determining TELCO's retirement rates. We used an ultimate trend rate equal to the average of ultimate trends rates used in the actuarial studies. We then determined a value for an initial trend rate for each Price Cap LEC such that a declining pattern of trend rates beginning with that initial trend rate and grading down to the average ultimate trend rate gave the same present value for a 30-year stream of projected claims payments as would be obtained by using the actual trend rates assumed in that Price Cap LEC's actuarial study. The composite trend assumption for TELCO was the pattern associated with the average initial trend rate grading down to the previously determined average ultimate trend rate.

Calculation of GNP BLI and TELCO BLI

We define the Benefit Level Indicator ("BLI") to mean the percentage of total medical claims incurred by an employer's retirees that will be reimbursed by the employer's benefit program. This definition applies only to the plan for which the employer's active employees may become eligible and the BLIs are based only on current levels of medical costs and Medicare reimbursement. We consider only current levels because the SFAS 106 requirement to value the "substantive" plan suggests that it is reasonable to assume that plan provisions (e.g., deductibles, out-of-pocket maximums, etc.) will generally be projected (either explicitly or implicitly) to stay consistent with aggregate cost levels. In general, the liability for current retirees is already being expensed on a pay-as-you-go basis and is a function of prior plan provisions. As noted earlier, the impact of current retirees on SFAS 106 costs is taken account of in the Current Retiree Adjustment.

Thus, in order to calculate the BLI of a given employer's post-retirement medical plan one needs the plan provisions and an anticipated frequency distribution of medical charges broken down by type of charge and size of charge.

The calculation itself is very detailed, but relatively straight forward. For each type and size of annual claim pre- and post-65 (e.g., hospital charges between $5,000 and $6,000 incurred before age 65), the plan's provisions (i.e., deductible, coinsurance, etc.) are applied and a plan reimbursement amount is calculated, allowing for any integration with Medicare benefits.

After all plan reimbursement amounts are calculated, the frequency distribution is applied to calculate an overall average reimbursement ratio compared to total medical charges. This ratio is then adjusted for the amount of required retiree contributions called for by the plan. The result is the net BLI. Because of the significant differences between plan provisions that apply to retirees pre- and post-65 (Medicare integration, contribution levels, etc.), two BLIs are calculated, pre- and post-65. These two BLIs are then weighted to generate an overall BLI for the employer.

As noted above, the calculation of an employer's BLI requires both a data base of employer plan provisions and a detailed medical claims distribution. With respect to plan provisions, we have utilized a data base of over 1,000 employers which includes 830 employers who sponsor post-retirement medical programs. For each of these employers, we have detailed plan provisions which include for pre- and post-65 coverage for each type of medical charge (surgery, hospital, physicians, drugs, etc.):

- Eligibility requirements
- Deductible
- Coinsurance
- Out-of-pocket maximums
- Plan reimbursement maximums (annual and lifetime)
- Required contributions for employee and dependent coverage
- Type of Medicare Integration

The data base includes only limited information on dental coverage and no information on post-retirement life insurance. The data base itself is comprised mostly of large employers with over 1,000 employees and is distributed throughout all six of the major industry categories outlined by the General Accounting Office in its recent survey of the prevalence of post-retirement medical programs. In total, the data base covers approximately 19 million of the estimated 38 million employees who work for employers who sponsor post-retirement medical programs. A summary of the data base appears in Appendix A.

With respect to the distribution of medical claims, we utilized a distribution based on the actual 1990 experience of 39,436 retirees (pre- and post-65) covered by employer sponsored post-retirement medical plans administered by one large national insurance company. The data includes detailed breakdowns of claim amounts by size and type of claim. It covers plans throughout the United States and, to our knowledge, does not have any geographic or industry bias.

To derive GNP-BLI, Benefit Level Indicators were calculated for each employer in the data base, then a comparison was made between our data base of large employer plans and the employers who make up the GNP. In making that comparison, we utilized information from the United States General Accounting Office March 1990 Report on "Extent of Companies Retiree Health Coverage", including unpublished supporting data obtained directly from the GAO staff. In particular, average BLIs by industry (weighted by number of employees) were determined from our data base. These average BLIs were then weighted by the percentages of covered employees working in each major industry as determined by the GAO survey. These weighted values were then averaged to come up with BLIs for the GNP for pre-65 and post-65 coverage separately. The pre- and post-65 BLIs were then weighted, based on the average demographics and retirement experience of the national workforce, to produce GNP-BLI.

TELCO in total sponsors 18 post-retirement medical programs (i.e. one or more for each of the Price Cap LECs). The same BLI calculation process described above was utilized to determine the pre- and post-65 Benefit Level Indicators for each of the 18 employee groups. These 18 sets of BLIs were then combined on an employee weighted basis to derive pre- and post-65 BLIs for TELCO as a whole. The pre- and post-65 BLIs were then weighted and combined on the basis of national average demographics and retirement patterns to produce TELCO BLI. The numerical derivation of GNP BLI and TELCO BLI is outlined below.

<u>Calculation of Benefit Level Indicator for Average Employer in GNP</u>

1. Calculate pre- and post-65 BLIs by industry from data base.

Industry	*Pre-65 BLI*	*Post-65 BLI*
Mining & Manufacturing, etc.	*.7232*	*.2340*
Construction	*.7758*	*.0604*
Transportation/Utilities	*.7974*	*.2643*
Retail	*.4730*	*.0603*
Finance/Insurance	*.6721*	*.1926*
Consumer Services	*.5771*	*.1267*

2. Calculate industry weighted average BLIs using industry weightings from GAO study. (See Appendix A for industry weightings from GAO study)

Industry Weighted Average BLI Pre-65	=	*.6898*
Post-65	=	*.2008*

3. Calculate GNP BLI based on national demographics (retirement age = 63). (See Appendix B for methodology for determination of pre- and post-65 weightings)

GNP BLI = .2568

Calculation of Benefit Level Indicator for TELCO

1. Calculate pre- and post-65 BLIs for each plan sponsored by TELCO:

Weighted Average Benefit Level Indicators for TELCO

Pre-65	=	.8295
Post-65	=	.3885

2. Calculate TELCO BLI based on national demographics:

TELCO BLI = .4390

Calculation of Demographic Adjustment

Even if the Benefit Level indicators of the GNP were equal to that of the average Price Cap LEC (i.e. if GNP BLI were equal to TELCO BLI), they would not necessarily generate the same anticipated retiree claim cost per active employee. If TELCO employees exhibit different turnover than other employees in the GNP, a different percentage of TELCO's employees will reach retirement. This will result in a different retiree claim cost per active employee. As can be seen from Appendix A, TELCO will in fact utilize lower rates of turnover than those used by other employers in determining SFAS 106 costs. Because of this an adjustment of *.7788 (Turnover rate adjustment)* will need to be applied to the BLI ratio.

Furthermore each $1 of TELCO anticipated claim cost will not translate into the same amount of SFAS 106 cost as will each $1 of anticipated retiree claim cost in the GNP. This will be due to two types of demographic differences between TELCO and the GNP. In particular:

- TELCO employees are older and have more past service than those in the GNP.
- TELCO employees tend to retire at earlier ages than is true throughout the national economy.

The extent of these differences is illustrated in Appendix A, and will give rise to the following additional adjustments to the BLI ratio:

Adjustment due to age and past service differences = .8528 (age/service adjustment)
Adjustment due to earlier retirements among TELCO employees = .8188 (retirement rate adjustment)

The total demographic adjustment is derived as (turnover rate adjustment) x (age/service adjustment) x (retirement rate adjustment):

Demographic Adjustment = .7788 x .8528 x .8188 = .5438

The specific methods and assumptions utilized in the derivation of the above adjustment are described in Appendix B. In developing this as well as all future adjustments methodology was employed to ensure that no "double counting" of effects occurred.

Calculation of Current Retiree Adjustment

Because a significant portion of SFAS 106 costs will arise due to the amortization of the liability for current retirees we must allow for the possibility that the relative SFAS 106 cost impact of these current retirees will be different for TELCO than for the GNP. In order to address this, we calculated and compared the average current retiree benefit cost per active employee for TELCO and for the GNP (using for the GNP only the 30.7 million active employees who generate SFAS 106 costs)

For TELCO the average claim cost per current retiree is $3,075 while for the GNP it is $1,802. Furthermore the ratio of current retirees to active employees at TELCO is .4802 compared with .1726 for the GNP. Thus the ratio of current retiree cost per active employee of the GNP to that of TELCO is (.1726 x 1802) ÷ (.4802 x 3075) or .2106.

If the BLI ratio after applying Demographic Adjustment was also .2106 then no further adjustment would be required. However, the BLI ratio after the Demographic Adjustment is .3181 (.5850 x .5438). Current retirees at TELCO represent 21.09% of the increase in costs due to SFAS 106 and active employees represent the other 78.91%. Taking this into account, we calculate:

Current Retiree Adjustment = .7891 + (.2109 x .2106 ÷ .3181) = .9287.

Calculation of Pre-funding Adjustment

Thus far we have assumed that the increase in labor costs due to SFAS 106 for both the GNP and TELCO will equal expense calculated under SFAS 106 minus claim cost for current retirees (i.e. current "pay as you go" cost). If, however, either TELCO or employers in the GNP have been funding and/or accruing expense for post-retirement medical benefits in excess of "pay as you go" cost, then an adjustment must be made. In fact several of the Price Cap LECs have accumulated and are continuing to accumulate assets in trust to pay future post-retirement medical benefits. Therefore the increase in TELCO's labor costs due to SFAS 106 will be less than it would be had no pre-funding taken place. By making the conservative assumption that no similar accumulation of assets is taking place in the GNP, we calculate an adjustment equal to the increase in TELCO's labor cost if no pre-funding was taking place divided by the increase in TELCO's labor cost taking into account both accumulated assets and ongoing annual pre-funding contributions. Specifically the adjustment was determined as:

> (1991 TELCO SFAS 106 Cost assuming no prior funding - 1991 projected claims payment) + (1991 TELCO SFAS 106 Cost recognizing prior funding - 1991 projected claims payment + additional 1991 funding costs).

Therefore, expressing all amounts in $millions:

Pre-funding Adjustment = (2,858.4-905.5) + (2,693.1-1,205.8) = 1.313

<u>Calculation of Non-Covered Employees Adjustment</u>

Thus far, we have developed a BLI ratio and a set of adjustments that relate to those employees who generate SFAS 106 costs. We must still adjust this ratio to reflect the fact that while TELCO extends its post-retirement medical programs to its entire workforce, there are employers in the GNP who provide benefits to only a portion of their workforce and many employers who do not provide any post-retirement medical benefits at all. Finally, we must allow for public sector employees, none of whom generates SFAS 106 costs. In fact, the Non-Covered Employee Adjustment is simply the percentage of all employees in the GNP who could become eligible for post-retirement medical benefits programs sponsored by their employers which are subject to SFAS 106.

As can be seen in Appendix A, the US General Accounting Office performed a detailed survey in 1990 to determine the extent of post-retirement medical coverage provided by US employers in the private sector. The study concluded that of the 95.8 million private sector employees, 38.5 million work for employers who provide post-retirement medical benefits, but only 30.7 million of these 38.5 million employees could actually become eligible for benefits affected by SFAS 106, with the remaining 7.8 million being ineligible because they work for non-covered subsidiaries, work in non-covered job classes, or are covered by multi-employer plans which are not subject to SFAS 106. Since government entities are also not subject to SFAS 106 (but are part of GNP), we must adjust for all public sector employees who number 18.6 million. Thus we calculate:

Non-Covered Employees Adjustment = 30.7 ÷ (95.8 + 18.6) = .2684

Calculation of Per Unit Labor Cost Adjustment

Adjustments made thus far have taken account of the fact that employers with the same Benefit Level Indicator may have different SFAS 106 costs per employee. However, even if SFAS 106 costs per employee were the same, labor costs per employee may not be and thus the relative impact of SFAS 106 on per unit labor costs may not be the same.

In fact, the labor costs per employee are significantly higher at TELCO than for other employers in the GNP. This is due, in part, to demographic differences but is also due to the different mix of skilled and unskilled workers at TELCO compared to the average mix in the GNP. As shown in Appendix A, TELCO's total annual compensation per employee is $38,533 as compared to the national average of $29,500. Therefore, to reflect the fact that each $1 of per employee SFAS 106 cost will represent a smaller portion of total labor costs for TELCO than for the GNP, we calculate.

Per Unit Labor Cost Adjustment = 38,533 ÷ 29,500 = 1.3062

Calculation of Labor Cost Percentage Adjustment

Even after applying the Per Unit Labor Cost Adjustment we must address the possibility that the percentage of output represented by labor costs may differ between TELCO and the GNP. If this is so, then even if SFAS 106 had the same percentage impact on the labor costs of both TELCO and the GNP, there would be a difference in its impact on the total costs of each. Unlike the explicit nature of the calculation of the other Adjustments, the Labor Cost Percentage Adjustment has to be calculated implicitly as explained below.

For the economy as a whole output is synonymous with value added (which is total revenue minus the cost of purchased inputs) and labor costs represent 64.27% of total output. For TELCO output consists of the cost of goods plus value added: the cost of goods is 25.7% of output and value added is 74.3% of output. Labor costs at TELCO are $23,623.7M and represent 38.5% of value added.

The impact of SFAS 106 on TELCO's costs is both direct and indirect. The direct impact is the increase in TELCO's own labor costs: the indirect impact is the effect on the labor costs of TELCO's suppliers which is passed on in the prices they charge TELCO for goods.

Before calculating Labor Cost Percentage Adjustment we calculate the

Adjusted BLI Ratio = BLI Ratio x all Adjustments

= .5850 x .5438 x .9287 x 1.313 x .2684 x 1.3062

= .1360

This Adjusted BLI Ratio can be interpreted as meaning that for every percentage point by which SFAS 106 increases TELCO's own labor costs it will increase the labor costs of the average company in the GNP by 13.60% of a percentage point.

On the assumptions that TELCO's suppliers are like the average company in the GNP and that all additional costs will be passed through completely into prices (and into the GNP-PI) an increase of one percentage point in TELCO's own labor costs will increase TELCO's overall costs:

- by 1% of 38.5% of 74.3% of output in respect of its own labor costs, and *(i.e., 1% of the percent of output represented by TELCO's labor costs)* = .2861% of output

- by .1360% of 64.27% of 25.7% of output in respect of its suppliers' prices *(i.e., by .1360% of the percent of output represented by TELCO's suppliers' labor costs)* = .0225% of output

- for a total of .3085% of output

The corresponding increase in the GNP-PI will be

.1360% of 64.27% of output = .0874% of output

Thus the GNP-PI would reflect only .0874 ÷ .3085 or 28.33% of the additional costs incurred by TELCO due to SFAS 106. The Labor Cost Percentage Adjustment has increased the factor of .1360 to a factor of .2833 thus:

Labor Cost Percentage Adjustment = .2833 ÷ .1360 = 2.0831

Extent to which Impact of SFAS 106 on All Employers in the GNP Translates into an Increase in the GNP-PI

In this section we describe the results obtained from a macroeconomic model developed to calculate the impact of SFAS 106 on the GNP-PI.

Motivation for the Macroeconomic Model

The macroeconomic model we use allows us to calculate the impact of SFAS 106 on prices in all sectors as well as the effect on the overall GNP-PI. We can get a simple view of how the price level is affected, as well as an appreciation of the need for a macroeconomic model, by first considering a "back-of-the-envelope" calculation of the effects of SFAS 106 on the price level. To make the interpretation of the calculation as simple as possible, suppose that in the absence of SFAS 106 the GNP-PI would remain constant over time; that is, the rate of inflation would be zero. Later we will consider the more realistic scenario in which there is ongoing inflation in the absence of SFAS 106.

The back-of-the-envelope calculation involves two steps:

(1) the percentage increase in the price of goods in a given sector equals the percentage increase in the cost of a unit of labor multiplied by the share of labor cost in total costs in that sector; and

(2) the percentage increase in the overall price index is calculated as the weighted average of the price increases in each sector.

As an example suppose that the economy is divided into two sectors. One sector, accounting for 68% of GNP pays no post-retirement health benefits and its costs per unit of labor are not directly affected by SFAS 106. In the second sector, which accounts for 32% of GNP, SFAS 106 directly increases the cost per unit of labor by 3%, and labor costs account for 64% of total costs. According to the back-of-the-envelope calculation, total costs and prices will increase by 1.92% (64% of 3%) in the second sector, and the overall price index will increase by .614% (32% of 1.92%). However, as we discuss below, this calculation overstates the effect on the overall price level.

Why does the back-of-the-envelope calculation overstate the size of the increase in the overall price level? The introduction of SFAS 106 will increase the cost of labor for employers who offer post-retirement health benefits and this increase in cost will lead to a variety of market adjustments. Although the full scope of market adjustments and their interactions can be complex (as detailed in Appendix C) we can get a simple view of the effects by first examining the effects in the labor market.

Because SFAS 106 increases the labor costs of employers who offer post-retirement health benefits, these employers will demand a smaller amount of labor at any given level of the wage rate. This reduction in the demand for labor will reduce the wage rate (not including post-retirement health benefits) facing all employers. The reduction in the wage rate will reduce labor costs of employers who do not offer post-retirement health benefits. Labor costs of employers who do pay post-retirement health benefits will increase by less than the direct impact of SFAS 106 on labor costs captured in the back-of-the-envelope calculation. With competition forcing prices to stay in line with costs, prices will fall in the sector that does not offer post-retirement health benefits and prices will rise by less than in the back-of-the-envelope calculation for employers who offer post-retirement health benefits. With prices rising in one sector and prices falling in the other sector, the <u>overall price level</u> may change by only a small amount.

Although the overall price level may change very little, the relative price of goods in the two sectors may change substantially to reflect the change in the relative labor costs arising from the differential impact of SFAS 106 on employers who offer post-retirement health benefits and employers who do not offer these benefits. In addition to effects we have already discussed, changes in labor costs arising from SFAS 106 will affect the mix of capital and labor used by employers in different sectors, and resulting changes in the prices of goods will shift demand away from the sector with an increased price toward the sector with a decreased price. The shift in demand will cause a reallocation of resources from one sector to the other. All of these additional adjustments are captured by the macroeconomic model which is used to get a quantitative measure of the impact of SFAS 106 on the prices of goods in each sector as well as on the GNP-PI.

Now let's consider the more realistic scenario in which there is ongoing inflation before the introduction of SFAS 106. Over the long run, the price level is very strongly related to the level of the money supply, and the rate of inflation is very strongly related to the growth rate of the money supply. With ongoing money growth there will be ongoing inflation, and the question is how much SFAS 106 affects the price level <u>compared to the value it would have reached in the absence of SFAS 106</u>. The basic results we presented above still hold, but with a slight re-interpretation: Whenever we said that a price increases, we now mean that it increases <u>relative to the level it would have attained in the absence of SFAS 106</u>; whenever we said that a price or wage decreases, we mean that it decreases <u>relative to the level it would have reached in the absence of SFAS 106</u>. Thus, for example, if we find that in the absence of ongoing inflation, SFAS 106 would reduce the wage by 2%, then in the presence of ongoing inflation of 5% per year, the wage would rise by 3% over the course of the year, so that it ends up 2% below the value it would have attained in the absence of SFAS 106 (if the effects of SFAS 106 were fully realized within one year). Thus, when we report that SFAS 106 causes some prices and wages to fall, we mean only that these prices and wages are lower than they would have been without SFAS 106 -- not necessarily that we will observe actual declines in these prices and wages between one date and some later date. This focus on the effect of SFAS 106 on prices and wages relative to values they would have reached is the correct focus for analyzing the question at hand: What is the impact of SFAS 106 on the GNP-PI?

We have explained that SFAS 106 will cause some prices to rise and other prices to fall relative to their values in the absence of SFAS 106. To get a quantitative measure of this effect we use a mathematical macroeconomic model.

Modeling Strategy

To study the quantitative impact of SFAS 106 on the GNP-PI we use a mathematical macroeconomic model that incorporates production costs for various goods and national demands for these goods. The impact of SFAS 106 is modeled as a direct increase in the cost of labor of employers who offer post-retirement health benefits, and the solution of the model indicates the ultimate effects on the prices of various goods and on the private sector price index. The model is best viewed as a long-run model that fully incorporates the effects of SFAS 106.

Before constructing a macro model to study the price impact of SFAS 106, it is helpful to list a set of desirable criteria for a macro model that can be used to analyze this question. First, the model should be a multi-sector model because SFAS 106 will have different direct impacts on different sectors. In particular, SFAS 106 will directly increase the cost of labor of employers who offer post-retirement health benefits (which we treat as sector 2), but will have no direct impact on employers who do not offer post-retirement health benefits (which we treat as sector 1).

Second, the model should explain how the costs of production are related to the cost of labor and other inputs. At the same time, the model should allow for the possibility that capital may be substituted for labor when labor becomes more expensive as it does in the SFAS 106 sector, and the model should also allow for the possibility that labor may be substituted for capital when labor becomes less expensive as it does in the sector that does not offer post-retirement health benefits.

Third, the model should provide a specification of the aggregate demand for goods related to the overall price index as well as the demands for the different goods produced in the different sectors. Combining the demand structure with the cost structure will permit calculation of the impact of cost changes in each sector on quantities, and more importantly, on prices. Then the price index can be computed.

Fourth, the model should be tractable so that numerical solutions can be computed and readily interpreted.

Fifth, the model should be internally consistent and based on sound economic foundations.

The criteria listed above for an appropriate model guide our choice of a model. To that end, we have developed a macroeconomic model that draws heavily on the model presented in an article published by two prominent macroeconomists -- Olivier Blanchard of M.I.T. and Nobuhiro Kiyotaki of the University of Wisconsin -- in the September 1987 American Economic Review. This article presents a multi-sector macroeconomic model that explicitly accounts for production and cost conditions as well as aggregate demand. Although the model is economically sophisticated and requires some mathematical manipulation to solve, the basic structure is quite tractable. Finally, the model has the advantage of being based on sound economic principles and is internally consistent.

The precise mathematical structure of our adaptation of the Blanchard-Kiyotaki model is presented in Appendix C. Here we will simply describe the three major components of the model:

(1) the demand for goods;

(2) the production functions;

(3) the supply of labor.

(1) The demand for goods. The model is a two-sector model, which means that there are two types of goods. If the relative prices of the goods are held constant, the demand for goods is proportional to the overall level of aggregate demand which depends on the money supply and the overall price level. Changes in the relative price of the two goods shift demand away from the good with the increased relative price toward the good with the decreased relative price. The degree to which demand is shifted is measured by the price elasticity of demand, which is an input to the model.

(2) The production functions. Each type of good is produced using capital and labor. The amount of output that can be produced with any given combination of capital and labor is determined by a Cobb-Douglas production function. The Cobb-Douglas production function is one of the most widely used production functions in economics. Its most important characteristic is that for a competitive company, the share of labor cost in total cost is constant, regardless of the wage rate or the amount of output produced. In applying the model to the United States we specify particular Cobb-Douglas production functions that match the share of labor cost in total cost in the U.S. economy.

(3) The supply of labor. We have already pointed out that the introduction of SFAS 106 will reduce the demand for labor by firms offering post-retirement health benefits, and as a consequence, will reduce the wage rate relative to the level that would have prevailed in the absence of SFAS 106. The magnitude of the effect on the wage rate depends on the response of labor supply to the change in labor demand. The model characterizes the supply of labor in terms of the elasticity of labor supply with respect to the wage rate which measures the percentage fall in the amount of labor supplied resulting from a 1% fall in the wage rate.